

Special Issue Honouring Helias A. Udo de Haes: Columns

LCA and Beyond – A Farewell to Helias

Gjalt Huppes

Institute of Environmental Sciences (CML), Leiden University, Einsteinweg 2, The Netherlands (huppes@cml.leidenuniv.nl)

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Helias Udo de Haes retires this year, in May, from his university chair at Leiden University, also retiring from his activities in the LCA arena. This also closes off a period in the development of LCA in which he has been heavily involved at a global level. At CML, work on LCA started in the Eighties, in what now is the Department of Industrial Ecology. At the start, there was some reluctance on behalf of Helias, the subject being so far away from ecology and agriculture, where the contact with nature and people is so much more direct. He became convinced, however, that we as a university institute indeed had to play the academic role of methodology developers for LCA. He went for it, right from the start in the international arena, joining in and helping form the institutions involved, especially through SETAC in its activities to bring order to the terminology and framework of LCA. Simple things, like the strict separation of Inventory and Impact Assessment, are assets our community should value. In other domains of sustainability analysis the disorder of overlapping indicators 'in the chain' leads to unmanageable complexity. The stubborn logic of Helias, combining Occam's razor and Popper's optimistic view on scientific development, helped to create a clarity in discussion unusual in an applied science involving so many conflicting interests. Till 1994, developments were academic, with a more or less separate practice, as was the feeling, with of course some elements of standardisation of nomenclature, modelling modules, and exemplary cases, as is required in all applied sciences. Then, after the first SETAC publications on the LCA framework, ISO stepped in, in 1993, setting up the Technical Committee TC 207 on environmental management with Sub Committee 5 on Life Cycle Assessment. CML, defining its role in an academic sense, was not involved. Then, the emerging multi-stakeholder LCA community had its first large global meeting in Japan, at EcoBalance Conference number 1, in 1994. A mix of business representatives, government officials and academics discussed several aspects of LCA framework and modelling. Manfred Marsmann¹, effectively chairing ISO SC5, tried to lure us, as we saw it, into the world of dirty – or at least not ivory-white hands and of power-based compromises. Though political action with scientific support had always been a specialty of Helias, and CML, this seemed one bridge too far, the tiny CML in the world of big business and government. The invitation was declined.

Then, ISO took action. Manfred phoned and tried to convince us. We hesitated. Then he said "I will be at CML tomorrow morning, coffee time, and we will discuss." That morning Helias accepted to join, a big step for him and for CML, as from now on our LCA community would not only have academic discussions but also a 'party line'. This was reflected in main publications after finishing the ISO work, on LCA methodology in general and impact assessment in particular^{2,3}. In ISO, Helias went for it, as a political tiger, but always reflecting its academic role, to refine concepts and to

avoid ambiguities which so easily can resolve conflicting positions in a superficial way. This endeavour was not just academic, not just political action, to get the academic position nicely embedded, it was about helping change the world, in an environmentally relevant, now called *sustainable*, way. The work in ISO has been followed up by the UNEP/SETAC Life Cycle Initiative, created primarily through his initiative and endeavour. The focus there is on going further, beyond ISO, in establishing good practice, involving some limited further scientific development. But the main thrust is on the global dissemination of LCA and capacity building, especially in the developing world.

It has always been a frustration for him that environmental problems of evident priority, like habitat loss and overexploitation of natural resources, could not be fitted into the LCA framework in an adequate way. Though many tried, and he would be the first to have applauded such development, incorporating dynamics and spatial structure was not possible in the essentially static approach with at best a rough regional specification of LCA. This is one reason that Helias will shift back to his other work after retirement, combining action and science, in areas more directly related to nature conservation.

Using the ISO LCA framework, I may shortly survey the four stages of Helias' life cycle. Helias' basic education decided the scope of his life: investigative and action-oriented, focused on nature and environment. As a biologist, he chose a subject for his PhD⁴ which seems a curious sideline from hindsight. But from thereon, the scope was set on environmental science, on environmental action, and on action in science, all combined in CML, founded by him at Leiden University in 1977. Though these elements have since been present in his working life, there was a built-up second stage, an inventory one could say. In this stage all elements were gathered and put together, as a system, which, in stage three, the second half of his working life, led to numerous impacts, with the development of LCA as a major one. Having done that work, Helias now is ripe for interpretation, reflecting on the results in the fourth stage of his life cycle. We cannot wait for the final result of that stage, which may last another few decades, so I will do some interpretation myself, right now, with Helias' comments surely following.

Let me first give a short survey of the main events, not only as related to LCA, because related subjects have been covered as well in parallel. These parallel lines in industrial ecology, firstly, cover substance flow analysis and material flow accounting, with the Metals Programme⁵ as a highlight. Interesting combinations of LCA, SFA and economic modelling, as related to cadmium policy, were achieved there. Second, a main focus has been on life cycle management in agricultural production chains, leading to another department at CML, Environmental Biology. Some of the limitations of LCA can be overcome there, but these are limited to this agricultural domain of application for the time being. Third, a main part of his efforts were devoted to Environment

¹ Marsmann M (2000): The ISO 14040 Family. Int J LCA 5 (6) 317–318

² Guinée JB, ..., Udo de Haes HA, ... (eds) (2002): Handbook on Life Cycle Assessment. Operational Guide to the ISO Standards. Kluwer Academic Publishers, Dordrecht

³ Udo de Haes HA et al. (eds) (2002): Life Cycle Impact Assessment: Striving Towards Best Practice. Society of Environmental Toxicology and Chemistry (SETAC), Pensicola

⁴ 'The effectiveness of the statolith organ in human spatial orientation', Leiden 1970

⁵ Guinée JB, ..., Udo de Haes HA, ... (1998): Evaluation of risks of metal flows and accumulation in economy and environment. J Ecol Econ 30 (1) 47–65

Table 1: Highlights of Helias Udo de Haes: A career linked to LCA

1977	Founder of Centre of Environmental Sciences, Leiden University (CML)
Since 1977	Scientific director of CML
1987–1992	Professor in Environmental Science at Leiden University on behalf of WWF Netherlands
Since 1990	Member and long-term chair of the LCA Steering Committee of SETAC-Europe
Since 1992	Full professor in Environmental Science at Leiden University
1995–1997	Chairman 'Groupe des Sages', for EU-DG Environment to get the European Eco-labelling Programme started.
1996–1998	Chairman of LCA-NET, EU-DGXII-funded concerted action on LCA
1996–2000	Dutch delegate in various working groups in ISO TC207/SC5 on LCA
1996–2002	Chairman WG on Life Cycle Impact Assessment of SETAC-Europe
1998–2000	Chairman of CHAINET, an EU-DG Research-funded concerted action on analytical tools for chain analysis
2000–2001	Chairman of organising committee of the Life Cycle Initiative of UNEP-DTIE and SETAC
since 2002	Executive director of UNEP/SETAC Life Cycle Initiative

and Development the third department at CML. How to combine rising income for the local population with nature conservation, now an established approach in wildlife management, has been a central issue there from the start. Highlights with focus on LCA are summarised in Table 1.

Now, how can we approach the interpretation of LCA as it has been developed in the last two decades? This interpretation is not history, but future oriented, for decision support. Were choices made the right way; should we adjust the scope of LCA in the next feedback loop? Let me start the interpretation with one main strength, and weakness, of LCA: the focus on the system at hand in technological terms, with virtually total neglect of its further surroundings in terms of economic and social mechanisms. This simplification has allowed the decentralised application of environmental analysis, bringing environmental considerations close to day-to-day choices in production and consumption. Contrary to general prejudice, LCA is conceptually simple model, with easy to use software tools and practical data bases for its application. Especially economic models would require large research staffs and substantial projects for the case analyses, as are made routinely in LCA. However, the LCA community not only has kept the models simple, it has also, for a long time, kept itself closed off from the scientific world around. Cost-benefit analysis has older roots, good scientific papers, and broader embedding in society, and may cover the life cycle of a product system in many cases as well. The originally exclusive focus on public investment decisions was a limitation which has been overcome by CBA, broadening to policy evaluation, and more generally to decisions with costs and benefits, including environmental ones. This broadness is a clear advantage in triple bottom line sustainability analysis. Probably, the acceptance of an adjusted CBA, supported by environmental scientists, might have been much broader, broader even than current LCA. Objections to economists' approaches abound, but are they right? Of course not all environmental impacts can be quantified in welfare terms. True, but that does not forbid their specification and quantification in more physical terms in CBA, nor their evaluation along different paths, as in multi-criteria analysis. Helias, and we all, did not join this existing approach. We went a separate path, with much more focus on direct insight in the problem chains involved in economy and environment, and with a much closer link to specific policies, and with more focus on getting environmental insight for simple down to earth decisions in production and consumption. For quite some time, LCA outcompeted CBA. And it surely outcompeted broader economic modelling as developed in the energy domain especially, that applied in general equilibrium modelling (CGE) as performed by specialised econometrists. But both CBA and several forms of CGE are back in the race for supplying practical information for

sustainability decision support. Within or linked the LCA, impact assessment is increasingly influenced by economic reasoning, modelling and data. The limitations of both CBA and LCA, being partial systems' analysis tools, are overcome by ever more flexible full system models. One new branch of LCA, hybrid LCA, now starts to make the jump to full system analysis, combining with environmentally extended input-output analysis (EEIOA). This IO-framework also works well with the other roots of industrial ecology, substance flow analysis and materials flow accounting. But this hybrid analysis does not yet involve the empirical relations economists work with, like market mechanisms, supply dynamics, international trade mechanisms, and income effects. Steps in that direction are well possible, as input-output analysts have shown in theory and practice. Disconnected from LCA, the energy and climate problems have brought up such new modes of CGE modelling, linking broad economic models with relatively specific technologies, and specifying increasingly broad environmental impacts. If not reacting adequately to these challenges of CBA and CGE, it seems a matter of time when LCA will be forced into ever smaller niches. The discussions on rebound effects, coming from the energy domain, will induce more complex modelling on LCA, one way or another linking at least to economic modelling. Joining forces with economists seems a new challenge now, at the time of retirement of Helias.

Similarly, in the surroundings of LCA, the social approaches to governance have grown up and taken over initiative from simple rational choice approaches, the original realm of LCA. There is no global government to shape a rational bureaucracy, while the power of national governments to regulate production and consumption is diminishing. Why still go for LCA if governments don't reason from LCA and don't create incentives for its application? Our future depends on other mechanisms, even many environmentalists claim. Innovation management, ecological transformation, industrial transformation, ...: Helias' LCA is not part of that world. Aren't the big decisions shaping our future being taken on the basis of much more strategic considerations, way beyond LCA? Creating global habitats, outside markets; clearing markets where distortions lead to gross inefficiencies; and influencing R&D and investment decisions at the head offices of multinational corporations and large bureaucracies: That is what the world goes by. You don't need LCA for that. So, are we wrong to stick to old fashioned beliefs in rationality, hierarchical government and piecemeal improvements, fine-tuning the corrections on the market mechanism, showing firms the path to sustainable decisions by LCA, or improved LCA? No, we are not, is my somewhat political conviction. Of course such strategic processes play a role, are essential in the political game, and LCA, if substantially adapted, may play a direct role there as well. But strategies don't fall from clear skies, they build upon practical knowledge. And when strategic deals have been made, stubborn practice has to be created which helps guide the millions of decisions in production and consumption, and related policies, towards improved sustainability. So the detailed insight in relations between economy and environment remains essential, also in new governance.

So, what will Helias say in 30 years time about this interpretation? Did we make the right choices in broadening LCA now that he is leaving, so as to better cover a number of main effects of choices, while also making LCA more complex? Was it wise to join forces with economists now that complex models can simply be run on a PC? Sitting still on the spot will be the end of LCA. Strategic LCA choices are ahead if we want to help shape our future in a sustainable way. We will have to do without Helias, but probably with both his full consent on our intentions, and with his harsh criticism on all of that which seems internally inconsistent and on all of that which seems offending to good basic intuition on what is right and wrong.